Pacific Island Network Quarterly

Quarterly Newsletter of the
Pacific Island Network (PACN)
Inventory & Monitoring Program
July – Sept. 2011 / Issue no. 25

www1.coseecoastaltrends.net/modules/coral_reefs_and_climate_change/

Go there. Then share.

Page 8

National Park Service
U.S. Department of the Interior
Pacific Island Network
P.O. Box 52
1 Crater Rim Drive - Qtrs 22
Hawai'i National Park, HI 96718

The National Park Service (NPS) has implemented natural resource inventory and monitoring on a servicewide basis to ensure all park units possess the resource information needed for effective, science-based management, decision-making, and resource protection.

Program Manager:

Greg Kudray	808-985-6183

Pacific Island Network Staff:

Laura Arnold	808-985-6330
Asia Addlesberger	808-985-6320
Alison Ainsworth	808-985-6180
Daemerson Awong	808-985-6189
Tonnie Casey	808-985-6325
Anne Farahi	808-985-6181
Danielle Gross	808-329-6881 (x743)
Jacob Gross	808-985-6330
Kelly Kozar	808-985-6186
Ben McMillan	808-985-6184
Cory Nash	808-985-6185
Forrest Phifer	808-985-6189
Eliseo Queja	808-985-6189
Brian Sylvester	808-985-6182
Kimberly Tice	808-567-6802 (x1510)
Visa Vaivai	684-699-3982 (American Samoa)
Corie Yanger	808-985-6187

Steering Committee Members
ALKA – Aric Arakaki
HALE – Matt Brown
HAVO – Rhonda Loh
KAHO – Sallie Beavers
KALA – Eric Brown
NPSA – Tim Clarke
PUHE – Sallie Beavers/Daniel Kawaiaea
PUHO – Adam Johnson
VALR – Eric Brown
WAPA / AMME – Mike Gawel

Comments? Write to:
Cory Nash, Editor
Pacific Island Network Quarterly
P.O. Box 52
Hawai'i National Park, HI 96718
Phone: 808-985-6185
Email: corbett_nash@nps.gov
http://science.nature.nps.gov/im/units/pacn/

Mailing List: **NOTE:** Unless indicated all photos and articles are NPS.
Contributers: UMCES - IAN, C. Nash, D. Awong, A. Farahi, C. Meston, B. McMillan, G. Kudray, A. Ainsworth, J. Woerner, B. Sylvester, F. Phifer, J. Gross

Please pass this newsletter on

Monitoring Schedule

October

Water Quality Monitoring at KAHO & HALE

Vegetation Mapping at HALE

Invasive Plant Species Monitoring in the subalpine zone at HAVO

Plant Communities Monitoring in the subalpine zone at HAVO

November

Water Quality Monitoring at KALA, WAPA, AMME, PUHO, PUHE, & ALKA

Groundwater Monitoring at AMME & KAHO

Invasive Plant Species Monitoring in wet forest at HAVO

Plant Communities Monitoring in wet forest at HAVO

Benthic Marine Monitoring at KAHO

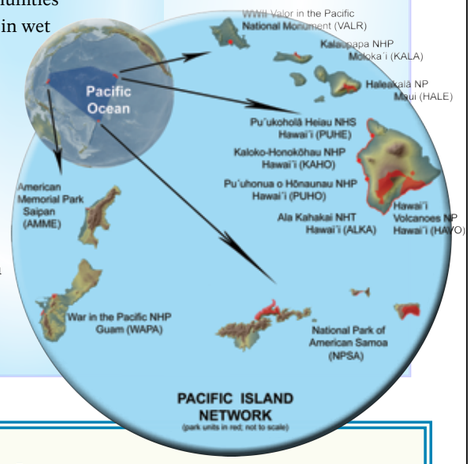
Marine Fish Monitoring at KAHO

December

Water Quality Monitoring at NPSA

Invasive Plant Species Monitoring in wet forest at HAVO

Plant Communities Monitoring in wet forest at HAVO



Websites to check out

Pacific Islands National Parks blog (over 265,000 views)
http://pacificislandparks.com/

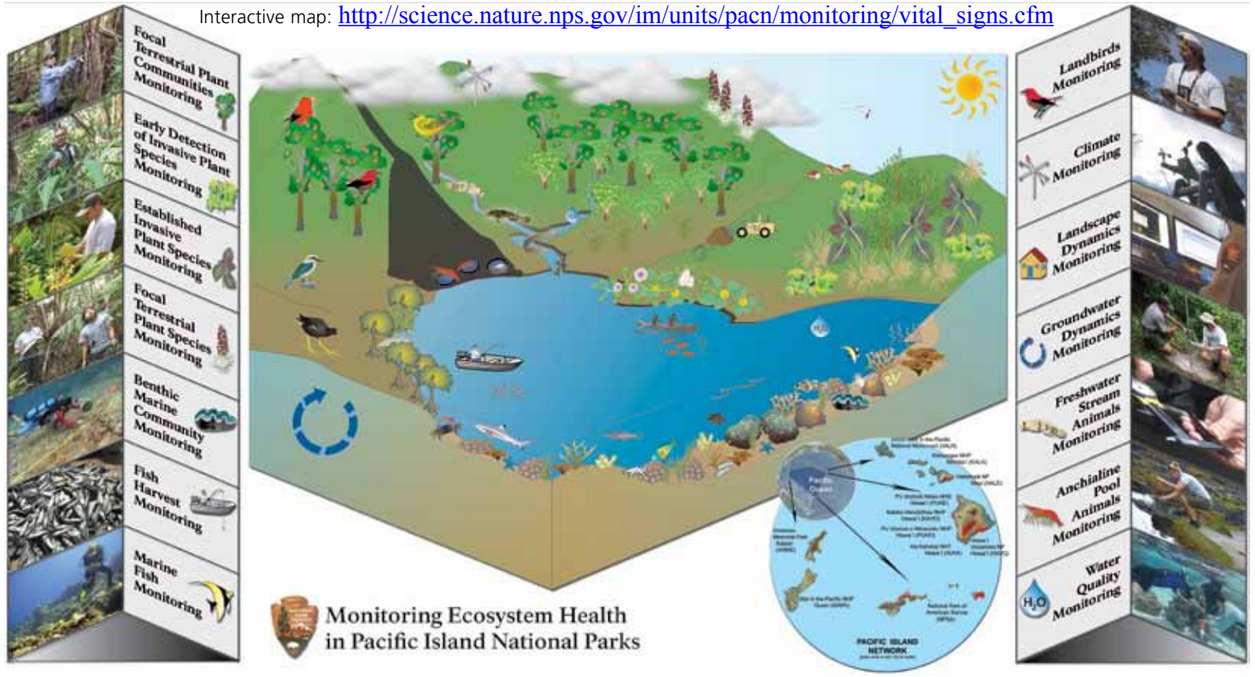
Learn about Palolo (It's that time of year again)
http://pacificislandparks.com/2011/09/09/yummy-worms-called-palolo/

Connecting Kids to Conservation (Project and funding ideas)
http://www.kidstoconservation.org/

Hawaii Environmental Education Alliance
http://heea.org/core/news/list.aspx

NPS Rivers, Trails, and Conservation Assistance Program (RTCA)
http://www.nps.gov/ncrc/programs/rtca/

Interactive map: http://science.nature.nps.gov/im/units/pacn/monitoring/vital_signs.cfm



Featured Staff

Jacob Gross –*Biotechnician*

Jake started working in natural resources during high school with the Youth Conservation Corps in North Dakota and Kansas. After completing a B.S. in Biology at Emporia State University, he felt the need to get out of the landlocked states and see some ocean. Internships at Hawai'i Volcanoes National Park with the USGS and the Hawksbill Sea Turtle Project introduced Jake to the island lifestyle and to his wife, Danielle. Together they enjoy the sun, the ocean, the friendly people, and the endless outdoor adventures of the Big Island.

Brian Sylvester –*Admin. Tech.*

My artist father worked on American Indian projects for the Arizona Highways magazine. As a boy, these projects gave me the opportunity to play with Hopi children on their Mesas. I developed a love for the land from the examples they taught. After a two year mission for my church, I joined the Air Force and served in South Korea and Kuwait. I then completed studies in Global Business Management at Bellevue U. and worked for an engineering company. In 2000, the entrepreneurial bug bit me and I created a land management company which I sold in 2008, and built a home in Joplin, Missouri. On May 22nd, our home was destroyed in the third largest tornado disaster in U.S. history. Five days before the tornado, the NPS offered me a position at the I&M office in Hawaii. We are grateful to be here.

Forrest Phifer –*Biotechnician*

Forrest Phifer was born along the rural Cedar River in Washington State. He attended the Evergreen State College in Olympia, WA, and graduated in 2004 with a dual B.S. in Biology and Environmental Science. Most of his work focus has been on riparian corridors and monitoring the impacts of "free range cattle" and logging practices on salmon bearing streams. When not combing the coastal areas and mountains of Hawaii to document the composition of plant communities, he can be found living in rainy Hilo, HI. Forrest spends his leisure time swimming and camping alongside the ocean, playing with his new dog, doing crossfit workouts, and creating experimental vegetarian recipes.

Born and Raised in Volcano

Here I am in the "field" at ages 6 and 26.

I have been surrounded by the rich cultural and natural resources of Hawai'i Volcanoes National Park for my entire life. The Hawaiian culture is centered on our natural surroundings. Everything from religion to politics involves some level of the natural environment.

As a child we went on a lot of different trails to the coast and the mountain within the park. On many of these hikes, an elder would tell a story or point out the importance of different plants or animals to Hawaiians. I remember when hula hālau would gather plants from the forest for performances. There are a lot of traditional (and park) rules about when you can harvest that aids in the sustainability of the different natural resources.

I have always known that I wanted to give back to my community and help my native people. I would have never guessed that I would have that opportunity in the place I feel so strongly attached to. One of the park's main missions is to protect natural and cultural resources, and it gives me great pride to be a small part of that mission. I work with the NPS Inventory and Monitoring Program to collect data on the plants in the park. The data can be used to show what types of invasive plants are threatening the native plant populations, and which management practices are working well. Monitoring data is important to understand the health of the forest and other plant communities over time.

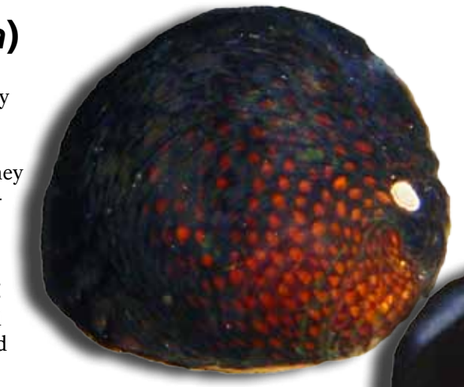
This is the most enjoyable and rewarding job that I have ever had. The job has taken me to remote areas and allowed me to witness, firsthand, how detrimental invasive plant species can be to a native forest. Last season we worked in the 'Ōla'a, Nāhuku, and east rift areas. The 'Ōla'a wet forest has invasive weeds such as palm grass, strawberry guava, and Himalayan raspberry that dominate certain areas. This season we are working in Kahuku from the pasture land up to the subalpine areas. The Kahuku wet forest is dominated by native species such as kōlea, pilo, kāwa'u, and 'ōhi'a. It is exciting to see an area dominated by native plants. We have also seen some rare and endangered species in Kahuku.

One of the biggest threats to the native forest in Kahuku is feral ungulates like pigs and sheep. The forest has a rich diversity of native plants in the canopy (older/taller trees), but has a problem with regeneration. There are hardly any native seedlings due to foraging and trampling by the sheep and pigs. Without new native plants to succeed the current canopy, invasive plants could take over the forest. Currently, there is a big effort to eliminate the sheep from the Kahuku area. The plant monitoring data we collect can help the park to determine if this sheep removal effort is working well.

It has been a great honor to be able to build on my skills and knowledge at Hawai'i Volcanoes National park. I have had the pleasure of working with some great biologists that showed me different techniques in identifying unknown species. My pool of knowledge has grown tremendously thanks to my coworkers, and I have been able to grow as a person as we share personal experiences and ideas. I have learned so much from my elders and my coworkers through the years, but there is much more to learn. I hope to be a part of protecting the resources in my backyard for many more years to come.

-D. "Koa" Awong, NPS Biotechnician

Hīhīwai (*Neritina granosa*)



The top of their shell is black. Underwater, the hīhīwai appear beautifully speckled by reddish colored dots. The underside of the shell as well as the operculum is an orange-brown color (below).

Description:

Hīhīwai are freshwater snails endemic to Hawaii, meaning they occur nowhere else in the world. They can grow to 1.5 inches in diameter, and have a very distinct coloration pattern with red dots on the top of the shell and an orange operculum on the bottom. The operculum is a structure attached to the upper surface of the snail's fleshy foot. It acts like a trap door covering the soft parts of the snail when they are retracted inside the shell.

Habitat & Diet:

Hīhīwai prefer very clean, well-oxygenated streams with rocky bottoms. Rocks are easy to grip and provide good mediums for the algae they scrape off to feed on. They are most abundant in fast-flowing, lower to middle stream reaches, but can be found in upper reaches as well. Their strong, muscular foot allows them to climb waterfalls and attach themselves firmly to rocks.

The nocturnal hīhīwai seen during the day represent only a small portion of the population that may be hiding under the rocks waiting for night.

Reproduction:

Hīhīwai deposit eggs in tiny whitish-brown capsules about the size and shape of a sesame seed. They will attach hundreds of egg capsules to rocks or even each other's shells. Each capsule contains about 250 eggs. When the eggs hatch, larvae are washed out to the ocean where they will spend up to a year before returning to a stream. The post-larvae, called spat, can be seen marching single file up the stream in large recruitment events usually during the summer months (see photo at right). The new recruits will migrate upstream until they find a suitable location to spend their adult life. This type of lifecycle is called an amphidromous lifecycle. Despite all of the travelling, most hīhīwai do not move more than 30 meters away from their initially established home location once they reach adulthood.

Tidbit:

The hīhīwai is also called wī, which means *famine* in Hawaiian. This suggests they were an important food source for native Hawaiians during times of food shortage. They are also a favorite food of some native birds such as the ʻaukuʻu (black-crowned night heron), and the ʻūlili (wandering tattler).

Threats:

The amphidromous lifecycle of the hīhīwai illustrates the strong mauka to makai (mountain to ocean) connection necessary for their survival. Hīhīwai need an uninterrupted connection between the stream and the ocean. Water diversions and dams can impede this connection. Also, habitat alteration such as the construction of concrete stream channels instead of natural rocky habitat can impact their feeding behavior. Finally, habitat degradation and pollution can lead to poor water quality, which hīhīwai cannot handle.

Hīhīwai in National Parks:

Hīhīwai are found in high quality streams on Kauaʻi, Maui, Molokaʻi, and Hawaiʻi Island. They are rarely observed on the island of Oʻahu due to the high level of stream alteration and degradation of streams on the island. The National Park Service Inventory & Monitoring Program monitors these snails in the streams of Haleakalā National Park and Kalaupapa National Historical Park.

For more information on hīhīwai: http://hawaii.gov/dlnr/dar/streams_native_animals.html

—A. Farahi, NPS Biotechnician

These young hihīwai spat were photographed during their upstream migration from the ocean to find areas to pass their adult lives.

A photograph isn't good enough? How about some video of a hīhīwai migration ? http://www.youtube.com/watch?v=1ssBfBqSAJI

HOT TOPIC

Do you recognize this bird ? You shouldn't.

Bryan's shearwater.
Photo by Reginald David

It's been almost four decades since a new species of bird had been recorded in Hawaii (In 1974, scientists described a honeycreeper called the po'ouli on Maui). According to a recent Smithsonian Institute DNA analysis of a shearwater specimen collected in 1963 on Midway Atoll, a distinct and entirely new species was identified.

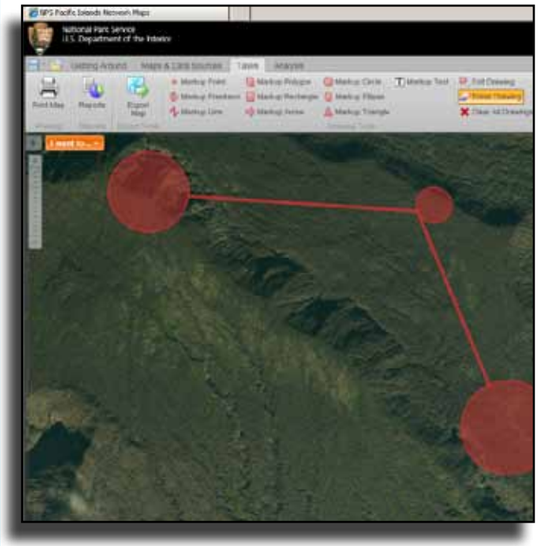
The newly realized seabird species is called the Bryan's shearwater (*Puffinus bryani*) after a former curator of collections at the Bishop Museum in Honolulu which housed the misidentified animal for decades. Very little is know about this bird, but it is believed to be the smallest known species of shearwater. It has not yet been confirmed whether or not the species is still flying over the Pacific Ocean or if it has gone extinct.

Science continues to uncover the secrets of the natural world.

Read more at:
http://smithsonianscience.org
(search for Bryan's shearwater)

Location, Location, Location

Situational awareness is a term commonly used in emergency operations and security centers. The term also applies nicely to those entrusted with carrying out the mission of the National Park Service. It is important to plan for potential safety issues in the field, and visualizing and analyzing what surrounds us is a principle of what we do. Pacific Island Network map services provide ever-evolving options aimed at streamlining information for national park managers. Features include: viewing park assets, conditions, and plot coordinates; using measuring tools; mapping markups; saving and sharing projects; uploading and viewing GPS points and shapefiles; running location searches; linking to Microsoft Bing™ or Google™ services; and enabling print-quality map templates to name a few.



During the March 2011 fissure eruption at Hawai'i Volcanoes National Park, this mapping capability was put into action to track and notify personnel of lava flows and fires as data became available. Ecologist David Benitez surveyed daily lava flows and fire perimeters and then published the updates to the map site, informing personnel of changes. This method was much more efficient than holding daily briefings or personally contacting individuals.

Mr. Benitez said, "I hope this collaboration leads to improved situational awareness for park staff. These products [web map services] will tremendously benefit emergency response efforts in the park by improving the clarity and usability of geographic information. These products also have the potential to build support for park management activities among local communities through better information sharing."

Wildlife Biologist Howard Hoshide, also with Hawai'i Volcanoes National Park, expressed his gratitude for these products, and has helped to test some of the functions. "We use this tool a lot!", explained Hoshide. "It really is much easier than trying to learn the newest ArcGIS software, and helps us with work plans. We use this prior to going out in the field to create project maps and share information with the people who need it."

http://pacn.maps.nps.gov

Although only available on National Park Service computers, this tool has also been leveraged to support dispatch and investigations in the parks. We hope that others will find that these products can simplify their daily workflows as well. As we build capabilities that enhance our specific mission with the NPS Inventory & Monitoring Program, it is a great bonus to be able to share and contribute to other NPS programs along the way.

—B. McMillan, NPS
GIS Specialist

Vegetation Changes in Kīpahulu Valley

Haleakalā National Park

Recent Inventory & Monitoring Program vegetation mapping field surveys have provided a surprising glimpse of how vegetation has changed in Haleakalā National Park's Kīpahulu Valley since the eradication of pigs almost 25 years ago. This summer, we surveyed seven vegetation plots (400 m² each) in two pig-free exclosures in upper (3000-6500 ft.) and lower (2300-3100 ft.) Kīpahulu Valley. Originally surveyed in the mid-1980's prior to the 1988 pig removal, the plots were resurveyed and vegetation was recorded by species and by canopy cover following the I&M vegetation mapping protocol. These new cover data were then compared to historic plot cover data to examine changes over time.

In the higher elevation site (upper Kīpahulu), species richness (number of plant species found) did not differ significantly between 1986 and 2011 (Figure 1). Vegetation cover was also similar. These data suggest that vegetation at this site was not heavily impacted by pigs to begin with, likely due to the lack of preferred food sources such as hāpu'u (*Cibotium spp.*) and 'ōhā wai (*Clermontia spp.*) at the higher elevations in the valley.

However, in lower Kīpahulu Valley species richness more than doubled over this 25 year time period (Figure 1). This is primarily due to a four-fold increase in native species. Vegetation cover increased in the understory resulting in a significant decrease in bare ground following pig removal (Figure 2). These data suggest that pigs were impacting understory vegetation within this site. Similar to other studies, the greatest impacts of pigs appear in the ground layer including herbaceous vegetation and regenerating woody species.

As expected, few changes were detected in the tree canopy with the surprising exception of the native koa tree (*Acacia koa*). Koa canopy cover decreased significantly during this time period (Figure 2). This decline is likely related to recent outbreaks (2003 and 2008) of the Hawaiian koa moth (*Scotorythra paludicola*) as opposed to pig impacts. Additional research is needed to establish population trends and investigate possible causes of the decrease in koa cover.

Invasive plant species cover was similar between 1986 and 2011 (Figure 2), but the dominant weed species dramatically changed (Figure 3). In 1986, Hilo grass (*Paspalum conjugatum*) covered over 50% of the ground with small percentages (<5%) of several other invasive plants. With the pigs removed, in 2011 the most abundant weeds were the woody species Koster's curse (*Clidemia hirta*) and strawberry guava (*Psidium cattleianum*). This shift from herbaceous to woody weed species is a major concern for management because these species are known to be aggressive ecosystem altering plants. Kāhili ginger (*Hedychium gardnerianum*), another aggressive invader, has relatively low cover due to control efforts by Haleakalā National Park since 1992.

In order for park managers to effectively manage the unique, relatively intact rain forest found within Kīpahulu Valley, it is essential to know which plant species are present and how they are changing over time. So, by overlaying some of our new vegetation mapping field plots on 25 year old survey plots, we were able to compare exposed soil and vegetation cover.

Surprisingly, we observed few changes in the higher elevations and many changes in the lower elevations. The lower elevation forest has been remarkably able to recover after the removal of feral pigs; however, there were also increases in aggressive weed species. Despite uncertainty regarding the cause of these changes (e.g., pigs, insects, advancing non-native plant invasion fronts, climate change); just documenting the changes helps to guide management actions to safeguard these precious natural resources.

—C. Meston, NPS Biotechnician
—A. Ainsworth, NPS Botaninst
—G. Kudray, NPS I&M Program Manager

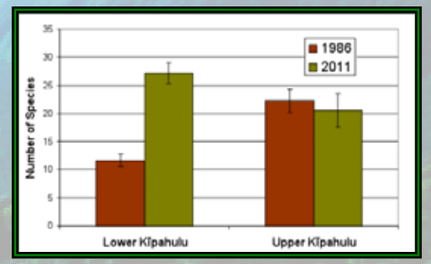


Figure 1. Species richness in lower and upper Kīpahulu Valley in 1986 and 2011.

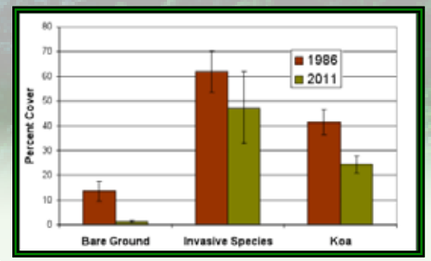


Figure 2. Average bare ground, combined invasive plant species percent cover, and native koa tree cover in lower Kīpahulu Valley in 1986 and 2011.

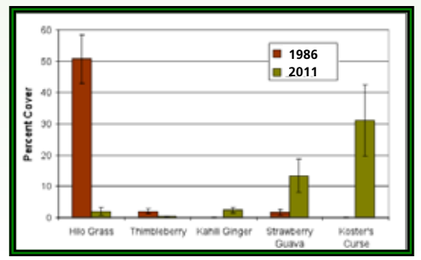


Figure 3. Invasive plant species percent cover shifted in lower Kīpahulu Valley between 1986 and 2011.

This study demonstrates some of the benefits of incorporating legacy data into current inventories.

Background photo. Kīpahulu valley wet forest at Haleakalā National Park.

Go There. Then Share.

www1.coseecoastaltrends.net/modules/coral_reefs_and_climate_change/

Coral reefs and climate change educational web module is live and ready for the classroom.

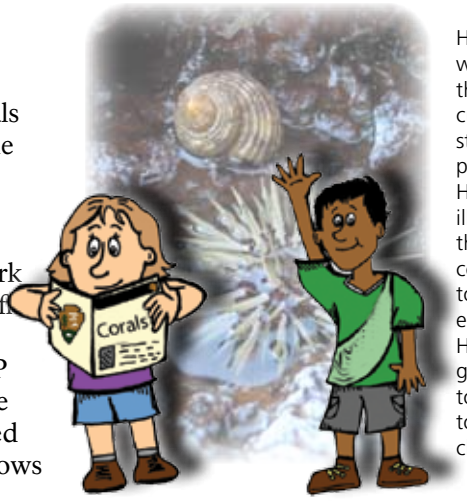
In the summer of 2010, the Pacific Island Network teamed up with the Integration and Application Network at the University of Maryland Center for Environmental Science to create a unique and innovative, web-based educational program that communicates coral reef science through inquiry and observation in the Pacific islands.

Careful web design and interactive elements allow users to explore the incredible biodiversity of coral reefs and collect data about coral cover with the same methods used by scientists. Users see into the future as unchecked carbon emissions increase ocean acidification and erode corals, and take charge by building their own reef ecosystems in Guam, Hawaii, or American Samoa with an interactive food-web game.

Specifically designed to allow students to choose their experience and observe the topics that are most interesting to them, this web module uses games, videos, and animations to help users observe reef ecosystems and inspire them to develop their own questions. Woven throughout the module are activities on sustainable fishing, traditional land use practices, and many other cultural, natural, and scientific connections to the resources. The text and activities are supported by several short movies on everything from local fishing pressures to encouraging students to take action by learning about and preserving reefs.

So how does the National Park Service benefit from this project? Beyond the intrinsic educational value of teaching about the plants and animals that make up the reefs, users have the opportunity to actually explore the biology of and threats to the reefs in four national parks. Case studies of coral reefs are set in the National Park of American Samoa, War in the Pacif NHP (Guam), Kaloko-Honokōhau NHP (Hawaii), and Kalaupapa NHP (Hawaii). The incorporation of these unique parks provides the user varied examples of reef ecosystems and allows the parks to highlight their reefs and associated threats like bleaching and sedimentation. Furthermore, actual Inventory and Monitoring Program benthic cover data is incorporated into the module to lend a real-world element to the scholastic science.

In addition to student resources like a glossary, the partnership created an Access Classroom Resource page where teachers can download the materials they need to implement module activities and lessons. Here, teachers can access teaching standards, learning objectives, and time requirements related to each activity. This information enables teachers to easily incorporate some or all of the activities into their lesson plans.



How do we tap into the natural curiosity students possess? How do we illustrate their connections to coastal ecosystems? How do we get them to relate to climate change?

The coral reefs and climate change module developed by this partnership differs from other web educational materials in a variety of ways: a) the materials are based on sound science and data, b) the classroom activities were designed by educators in collaboration with scientists and students, c) cultural connections and traditional practices are included to help engage Pacific islanders, and d) all of the web and classroom materials are vetted by teachers and reviewed by scientists. These materials conform with state, territorial, and federal high school and middle school education standards, but are uniquely targeted to Pacific island audiences.

Evaluation data from a focus group of science educators in the Pacific islands indicates that the content of the module is age and regionally appropriate, the classroom and outdoor activities are effectively integrated with the web pages, and that teachers believe that the module can be easily implemented in the classroom.

The next crucial step is the adoption of this program into classrooms. A week-long intensive teacher workshop on the module was hosted on O‘ahu in June, with hopes that the 16 Hawaii teachers who participated will use the program and share it with peers. A shorter workshop was held on Hawai'i in September, and more are planned for Guam and American Samoa next summer. However, introduction to this fully conceived, tested, and important science education program needs your help to broadcast its virtues widely.

Please take a few minutes to go to the website at the top of the page, and see for yourself the educational potential within. Then share it with every educator you know. We think that you will like it as much as we do.

—C. Nash, NPS
Science Communicator

—J. Woerner, UMCES
Science Communicator